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Font Digitizing:

Creating Fonts For Printers Automatically

A new font creation system from Octek is designed to relieve the drudgery and high cost of creating new digitized logos, characters and graphics patterns for dot matrix, ink jet and laser printers. A complete 96 character font can be digitized, edited and output to a PROM programmer in only 30 minutes, including the operator set up time, with this video-based digitizing system. Custom fonts and logos can be created quickly for special printer applications. The system replaces manual and tablet digitizing stations with a fully automated video digitizing process.

The font digitizing module is based on the company's Model 2000 Video Image Analyzer (See Box) Font creation software and a function keyboard complete the Model 4400 package. The 4400 digitizes each character or symbol with a resolution of 320 x 240 picture elements (pixels). The font software maps the high resolution digitized character into the desired dot matrix printer format.

The font creation process begins with a video scan of the character to be digitized. A standard vidicon television camera is used for this purpose. The 4400 digitizes the video scan in real time (1/60 second) and displays the digitized character so that the operator can check character alignment and picture quality (Fig. 1). Usually, all characters to be digitized are presented to the camera in sequence and the digitized picture is stored with high resolution on a floppy or hard disk. The digitized font can be recalled at any time to create a new dot-matrix printing pattern. This step saves having to re-digitize when a new dot-matrix font is created for a different dot matrix size or format.

Once the character set is permanently stored on disk, individual characters can be recalled by the operator for processing. First, the operator selects the desired dot-matrix printing format. The Octek 4400 can accommodate a dot matrix pattern ranging in size from 5 x 7 to 160 x 200 dots. The selected matrix is displayed on screen as a grid overlaying the digitized character (Fig. 2). The operator then simply depresses a key on the function keyboard to map the high resolution character into the lower resolution printing format. The mapped character is displayed as an array of dark blocks overlaying the original character (Fig. 3)

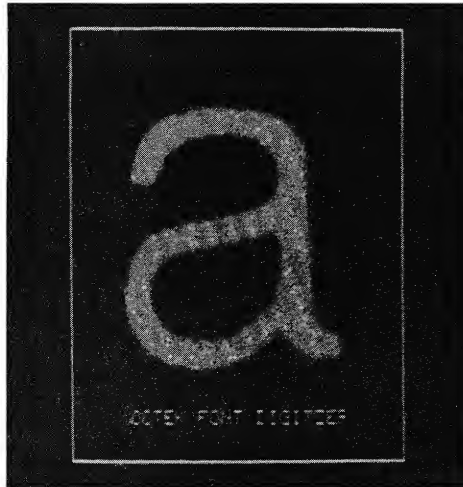


Figure 1—Digitized Character

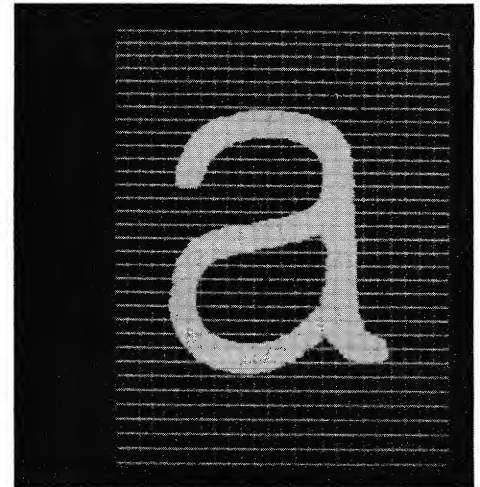


Figure 2—Dot Matrix Overlay

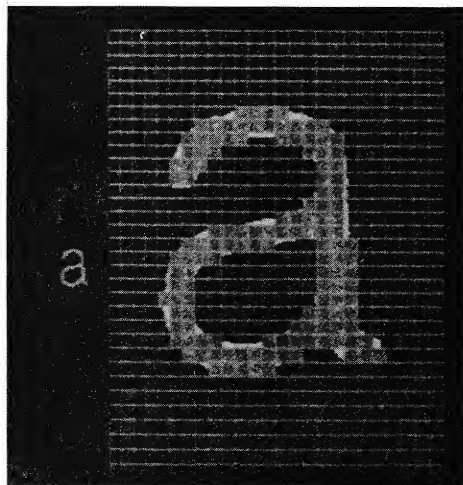


Figure 3—Character Mapped Into Dot Matrix Format with Scaled Character Shown at Left of Grid

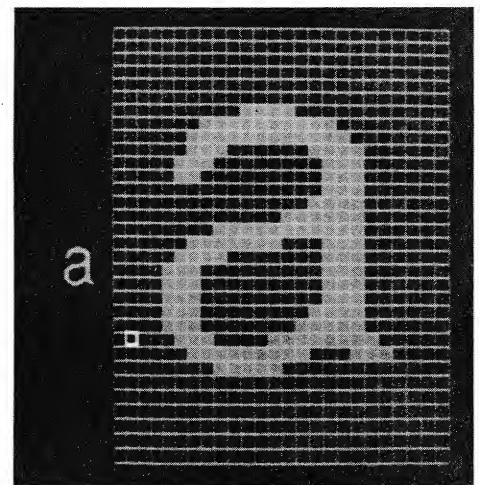


Figure 4—Completed Dot Matrix Character

to allow an operator to inspect the result. A small scale version of the character is drawn to the left of the grid to give the operator a sense of perspective, of the character as it would appear on a printed page.

If desired, the operator can edit the newly created character. A cursor can be positioned over a dot (Fig. 4) using the function control keyboard. The dot selected can be deleted or filled in by depressing the appropriate key. Thus, esthetic corrections can be made to create a visually pleasing dot matrix character. Following the editing process, the image of the new character is placed in an output file together with the other characters that

define the new font. A completed character is shown in Fig. 4.

When each character has been processed, the output file can be downloaded to a PROM programmer to create character PROMs for the desired dot-matrix printer.

The Model 4400 Font Digitizer Module is priced at \$16,275. The module includes software on magnetic tape, a Model 2000 Image Analyzer with interface panel, function keyboard, hardware character generator and graphics cursor. The module is compatible with any DG NOVA or ECLIPSE computer. Complete systems are also available from Octek, starting at \$44,500.

The Octek 2000 Image Analyzer

The heart of the 4400 Font Digitizer Module is the Model 2000 Video Image Analyzer. This versatile device digitizes video, stores images, provides video display, data processing and communicates with a host computer.

Here is how the Octek 2000 works:

Video Digitization

The video inputs to the Octek 2000 are EIA RS-170 compatible. This means that standard television cameras of the type that are used with closed circuit television monitors, video tape recorders or other equipment employing the RS-170 video standard can be connected directly to one of the video inputs. Incoming video is in a raster format. The electron beam that scans the target in a camera sweeps horizontally, then retraces and sweeps again. Simultaneously, the beam sweeps vertically, at a much slower rate so that a complete picture or "field" is formed in one sixtieth of a second. The analog video is converted into digital data in the Model 2000 by a high speed four bit A/D converter. Each four-bit byte represents the "grey Level" at one spot in the picture. This converter is synchronized exactly with the video input to create a clear, stable digital image. The result of this digitizing process is that the television camera input is converted into 307,200 bits of digital data up to sixty times a second.

Image Storage

Following digitization, the video data is directed to a digital translation table for data transform functions and then stored in image memory. The image memory has

the capacity to store a complete video field. Each picture element (pixel) is stored as a 4-bit word representing one of 16 grey levels. The memory is synchronized with the A/D converter, so that a complete image field is stored in one sixtieth of a second.

For applications that do not require 16 grey levels, the 2000's microprocessor can partition the memory into 3 bit, 2 bit or one bit image "planes". Up to four sequential images can be stored in this way for animation or motion studies.

The dual ported image memory can be accessed by the host computer during the same memory cycle as the video input or output. The computer does not have to wait until the digitizing process is completed in order to write to or read from the image memory.

Image Display

The image memory output is directed to four video outputs. The primary output is equipped with a 16 grey level Digital to Analog (D/A) converter. The remaining three outputs are binary video (black and white, no grey) only. They are intended for color output (when used with a color television monitor) or for operating multiple displays. The Model 2000 can display 16 colors at a time from a software pallet of 64 colors. In addition to 16 grey levels, the primary video output is equipped with an optional graphics cursor and hardware character generator. The cursor's coordinates, size and shape is programmable from the host computer. The hardware character generator displays 32 lines of text with up to 64 characters per line.

The video outputs generate standard RS-170 video, allowing the images to be displayed in raster format on a variety of popular video monitors.

Data Communications

Image data can be transmitted to or from the host computer by either Programmed I/O or Data Channel I/O (DMA). Under programmed I/O, the onboard microprocessor handles all data exchanged. DMA transfers are processed by a separate on board controller that controls the 2000's Image Memory directly. Full screen, 16 grey level pictures can be transferred to the host in less than a quarter of a second. Thus pictures can be stored and recalled from a disk quickly for picture data base applications, such as font storage and retrieval.

Data Processing

The various hardware functions designed into the Octek Model 2000 are controlled by an on-board high speed bipolar microprocessor, a Signetics 8X 300. The processor has total control of the Model 2000 and it can perform useful data processing functions as well. For example, image data can be read or loaded in blocks and image areas can be summed by the microprocessor. Beyond these activities, the processor may be programmed by the user to perform specific image processing or analysis tasks. An optional RAM memory permits the downloading of user developed programs. In addition to the firmware, the Octek 2000 comes with an assembly level driver and a Fortran level driver package.



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